

P24 - Paints based on renewable materials

Gilles Olive and Aurore Richel

*University of Liège, Gembloux Agro-Bio Tech, Unit of Biological and Industrial Chemistry, Belgium
Corresponding author: gilles.olive@eicvn.be*

Paints, at the coating meaning, are known since a long time. Typically, paint is a dispersion of one or more powders (pigments and fillers) in a macromolecular substance ("resin"), called film-forming material, diluted in solvents.

Pigments are solid particles, used to give opacity and/or color. Today almost all pigments have a synthetic origin. The fillers are often natural compounds. Unlike pigments, fillers have low opacity and are colorless. These very cheap products achieve the required solid content under satisfactory economic conditions.

Resins used in paints have the property of forming a continuous solid (hard or flexible) film under specific conditions. They are often called "resins". They can be solid or liquid at room temperature. The solvents are used to control the viscosity of the paint in order to facilitate its production and application. The solvents used are volatile compounds.

Additives are minor compounds (a few percent), whose function is to either promote or prevent some developments of the product. For example, surfactants improve the homogeneity of the dispersion. Some additives protect the film against mold or ultraviolet radiation, or against the formation of free radicals under the action of sunlight. Since the end of the 18th century most of those paints are petroleum-based. But the near disappearance of the petroleum causes a renewed interest in bio-based preparations. In this communication, we present an overview of bio-based alternatives.



Paints, at the coating meaning, are known since longtime. Some recipes can be found in old books scanned on the server Gallica from the Bibliothèque Nationale de France (BNF).^[1-2] Typically, a paint is a dispersion of one or more powders (pigments and fillers) in a macromolecular substances ("resin") called film-forming materials, diluted in solvents.

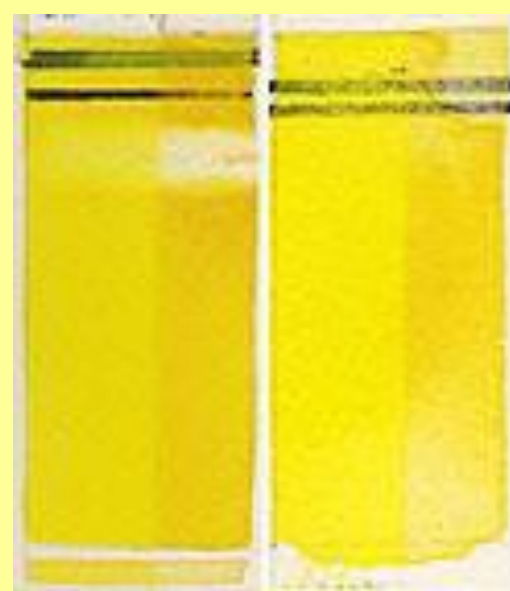
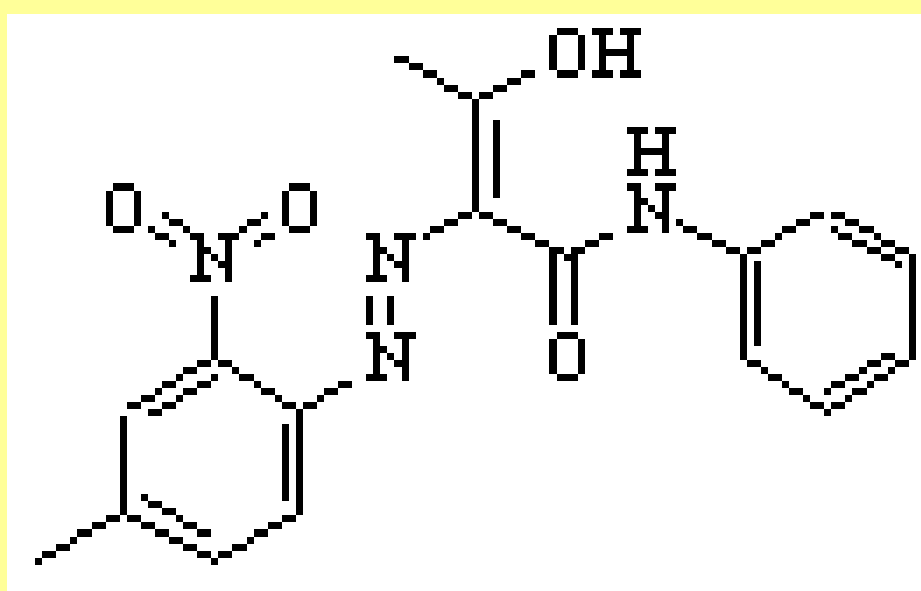
Pigments and *fillers* are powdery solids of varying particle size. The *pigments* are used to give opacity and/or color in the broadest sense, the color can be white or black. Today almost all *pigments* have a synthetic origin. The *fillers* are often natural compounds. Unlike pigments, the *fillers* have low and sometimes very low opacity and are colorless. These very cheap products achieve the required solid content under satisfactory economic conditions.

Macromolecular substances used in paints are film forming materials because they have the property of forming a continuous solid film under certain conditions. They are often called "resins". They can be solid or liquid at room temperature. They have different qualities and can provide hard or flexible films.

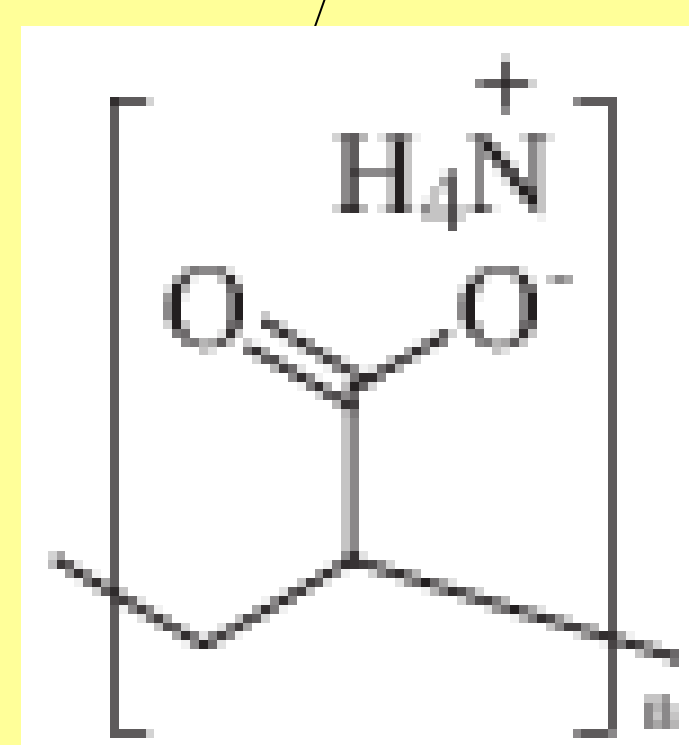
The *solvents* are used to control the viscosity of the paint in order to facilitate the production and application. The solvents used are volatiles compounds.

Additives are compounds used in low concentrations (a few percent), whose function is to either promote or prevent some developments of the product. For example, surfactants improve the homogeneity of the dispersion. Some *additives* protect the film against mold or ultraviolet radiation, or against the formation of free radicals under the action of sunlight.

Since the end of the 18th century most of those paints are petroleum-based. But the near disappearance of the petroleum causes a renewed interest in bio-based preparations. In this communication, we present the bio-based alternatives that can replace petroleum-based products.



Petroleum-based	Changeable by
Pigments Synthetic (PY1 (Hansa Yellow G))	Plant Meadowsweet - (<i>Filipendula ulmaria</i> L.)
Fillers All are from natural mineral products (most contain calcium carbonat)	
« Resin » Acrylic	Proteins
Solvent White spirit	Ethyl lactate (fermentation of corn starch)
Additives Wetting and dispersing: polyacrylate ammonium salt	fatty acid derivative of plant
Defoamer: polysiloxan	green defoamer with vegetal origin



[1] Jules Lefort, Chimie des couleurs pour la peinture à l'eau et à l'huile : comprenant l'histoire, la synonymie, les propriétés physiques et chimiques, la préparation, les variétés, les falsifications, l'action toxique et l'emploi des couleurs anciennes et nouvelles (Paris: V. Masson, 1855), 344 pp.
 [2] Amand-Denis Vergnaud, Manuel du peintre en bâtiments, du fabricant de couleurs, du vitrier, du doreur, du vernisseur et de l'argenteur. Sixième édition... refondue et... augmentée., ed. Roret (Paris: Roret,), 243 pp.